



National Aeronautics and
Space Administration



CLARREO Pathfinder Inter-Calibration Workshop

CPF Mission Requirements, Objectives, and Status

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<http://fpd.larc.nasa.gov/index.html>

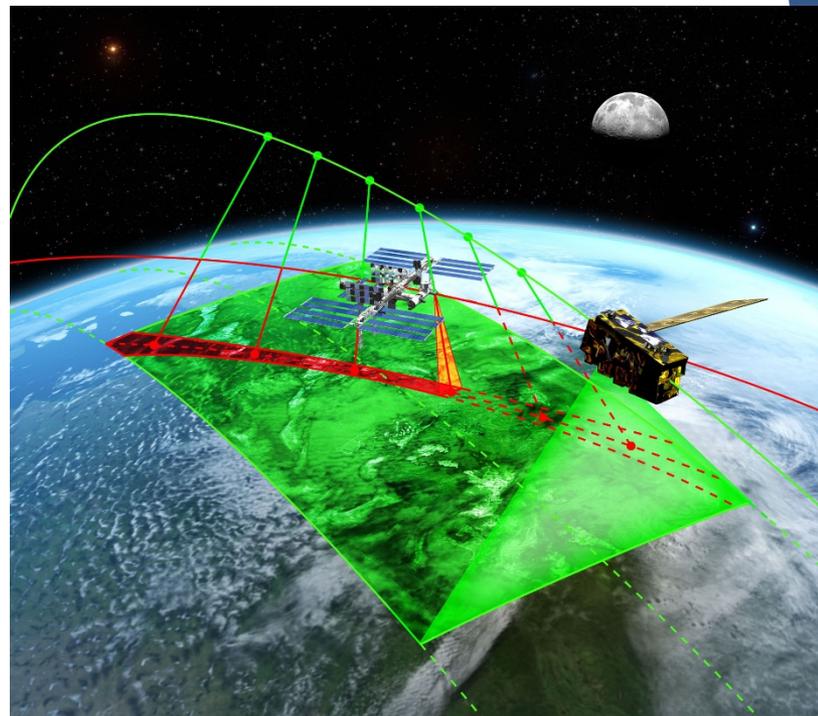
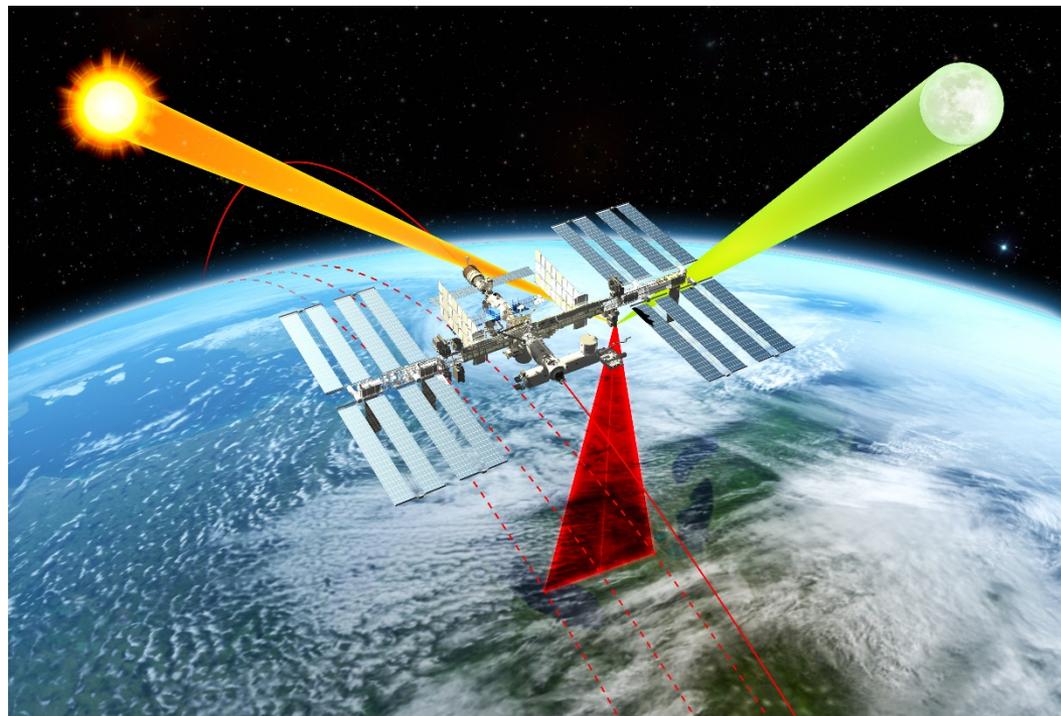


- **CLARREO Pathfinder is a directed mission through the NASA Science Mission Directorate – Earth Science Division**
 - NASA Langley has overall project management responsibility
- **CLARREO Pathfinder is a risk reduction mission for a potential future full CLARREO Mission**
 - *Two primary mission objectives:*
 1. Demonstrate on orbit, high accuracy, SI-Traceable calibration
 2. Demonstrate ability to transfer this calibration to other on-orbit assets
- **Project scope consists of formulation, implementation, launch, operation, and analysis of measurements from a Reflected Solar (RS) Spectrometer, launched to the International Space Station (ISS)**
- **Category 3 (NPR 7120.5E) / Class D Mission (NPR 8705.4), nominal 1-year mission life + 1 year science data analysis**
- **Targeted for launch in late CY2020 – early CY2021**
- **Authority to Proceed received April 11, 2016**

CLARREO Pathfinder is not the end, it is a critical step along the way to a full CLARREO Mission.

Demonstrate high accuracy SI-Traceable Calibration

Demonstrate Inter-Calibration Capabilities



Objective #1: Demonstrate the ability to conduct, on orbit, SI-Traceable calibration of measured scene spectral reflectance in wavelength range from 350 - 2300 nm, with an advanced accuracy over current on-orbit sensors using a reflected solar spectrometer flying on the International Space Station.

Objective #2: Demonstrate the ability to use that improved accuracy to serve as an in orbit reference spectrometer for advanced inter-calibration of other key satellite sensors across the reflected solar spectrum (350-2300 nm).

Demonstration Parameter	Measurement Uncertainty	
	Baseline Objective*	Threshold Requirement**
Spectrally-Resolved Earth Reflectance (350 – 2300 nm): SI-Traceable, referenced to spectral solar irradiance	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)
Spectrally-Integrated Earth Reflectance (350 – 2300 nm): SI-traceable broadband (350 - 2300 nm) spectrally-integrated Earth reflectance with spectral accuracy weighted using global average Earth spectrally reflected energy	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)
On-Orbit Inter-Calibration***: Demonstrate the ability to Inter-Calibrate with CERES/RBI short wave channel and VIIRS reflectance bands	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)

**Baseline Objective is within a factor of 2 of full CLARREO Tier-1 Decadal Survey Mission Requirements*

***Threshold requirement is a factor of 2 (CERES) to 4 (VIIRS) better than current capabilities.*

****Inter-calibration uncertainty are contributions from data matching noise.*



- **The CLARREO Pathfinder mission shall demonstrate on orbit calibration accuracy improvement over existing reflected solar instrumentation, and use these data to demonstrate inter-calibration with these instruments.**

- **CERES / RBI and VIIRS are the required instruments for demonstrating inter-calibration capability**
 - CERES / RBI Short Wave Channel
 - VIIRS Reflectance Bands
 - Inter-Calibration possibilities include CERES / VIIRS on Suomi NPP and JPSS-1, and RBI / VIIRS on JPSS-2

- **CLARREO Pathfinder project objective is to have the capability to acquire the data necessary to demonstrate inter-calibration with other Earth-observing instruments**
 - The objective is intended to get as much scientific value out of this risk reduction mission as possible within the available budget and schedule
 - ***Acquisition of data*** for demonstrating inter-calibration with instruments other than CERES/RBI and VIIRS will be as events of opportunity
 - ***Processing the data*** for demonstrating inter-calibration with instruments other than CERES/RBI and VIIRS is not within current CLARREO Pathfinder project scope / budget
 - We welcome the opportunity to work with other projects to arrange / advocate for the necessary funding

- **CLARREO Pathfinder is currently in pre-Formulation (pre-Phase A)**
 - Successful Mission Concept Review on August 24-26, 2016
 - Key Decision Point-A (KDP-A) gate review scheduled for January 12, 2017

- **CLARREO Pathfinder is a recognized International Space Station (ISS) payload and is listed on the MiPROM (MiPROM = ISS payload schedule planning tool)**
 - Instrument payload is planned to be accommodated on the ISS at Express Logistics Carrier #1 (ELC-1) Site #3
 - ISS has planned for an 18-month occupancy for the CLARREO Pathfinder payload (October 2020 through March 2022)
 - Includes 2-month commissioning period + 12 months prime mission operations

- **Project is currently performing the necessary work to establish contracts and partnerships during the Formulation phase of the project**

***Thank you for attending the CLARREO Pathfinder
Inter-Calibration Workshop!***

We appreciate and value your input.

